



COMMANDER NAVY REGION HAWAII

SAFETY NEWSLETTER

MAY 2005



Office Phone Numbers

For duty hours, 0700-1530
474-3447 ext. 0 or duty pager 577-7002
For Off-duty hours,
call duty pager 577-7002

Web Sites:

<https://intranet.pearlharbor.navy.mil>
www.hawaii.navy.mil/Safety/Safety_Main.htm

HEAT STRESS

Environments

From ironworkers to pastry bakers, Americans work in a wide variety of hot or hot and humid environments:

- ❖ Outdoor operations in hot weather include roofing, road repair and construction.
- ❖ Iron, steel and nonferrous foundries.
- ❖ Brick-firing and ceramics operations.
- ❖ Electrical utilities (particularly boiler rooms).
- ❖ Bakeries.
- ❖ Restaurant kitchens.
- ❖ Laundries.
- ❖ Smelters.
- ❖ Steam tunnels.

Being uncomfortable is not the major problem with working in high temperatures and humidities. Workers who are suddenly exposed to working in a hot environment face additional and generally avoidable hazards to their safety and health. Employers should provide detailed instructions and preventive measures and adequate protection necessary to prevent **heat stress**.



HOW THE BODY HANDLES HEAT

The human body, being warm blooded, maintains a fairly constant internal temperature, even though it is being exposed to varying environmental temperatures. To keep

internal body temperatures within safe limits, the body must get rid of its excess heat, primarily through varying the rate and amount of blood circulation through the skin and the release of fluid onto the skin by the sweat glands. These automatic responses usually occur when the temperature of the blood exceeds 98.6°F and are kept in balance and controlled by the brain. In this process of lowering internal body temperature, the heart begins to pump more blood, blood vessels expand to accommodate the increased flow, and the microscopic blood vessels (capillaries) that thread through the upper layers of the skin begin to fill with blood. The blood circulates closer to the surface of the skin, and the excess heat is lost to the cooler environment.

If heat loss from increased blood circulation through the skin is not adequate, the brain continues to sense overheating and signals the sweat glands in the skin to shed large quantities of sweat onto the skin surface. Evaporation of sweat cools the skin, eliminating large quantities of heat from the body.

As temperatures approach normal skin temperature, cooling of the body becomes more difficult. If air temperature is as warm as or warmer than the skin, blood brought to the body surface cannot lose its heat. Under these conditions, the heart continues to pump blood to the body surface, the sweat glands pour liquids containing electrolytes onto the surface of the skin and the evaporation of the sweat becomes the principal effective means of maintaining a constant body temperature. Sweating does not cool the body unless the moisture is removed from the skin by evaporation. High humidity causes the evaporation of sweat from the skin to decrease and the body's efforts to maintain acceptable body temperature is significantly impaired. These conditions adversely affect an individual's ability to work in the hot environment. With so much blood going to the external surface of the body, relatively less goes to the active muscles, the brain, and other internal organs; strength declines; and fatigue occurs sooner than it would otherwise. Alertness and mental capacity may be affected. Workers who must perform delicate or detailed work may find their accuracy suffering, and others may find their comprehension and memory lowered.

SAFETY PROBLEMS... Aside from these obvious dangers, the frequency of accidents, in general appears to be higher in hot environments than in more moderate environmental conditions. One reason is that working in a hot environment lowers the mental alertness and physical performance of any individual. Increased body

temperature and physical discomfort promote irritability, anger, and other emotional states that sometimes cause workers to overlook safety procedures or to divert attention from hazardous tasks.

HEALTH PROBLEMS

Heat Stroke is the MOST serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached. **Symptoms:** A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur. **Treatment:** Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. Remove the victim to a cool area, thoroughly soak the clothing with water, and vigorously fan the body to increase cooling. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

Heat Exhaustion includes several clinical disorders having symptoms that may resemble the early symptoms of **heat stroke**. **Symptoms:** Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated. **Treatment:** in most cases involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

Heat Cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. **Symptoms:** The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs, or abdomen, but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps. **Treatment:** Cramps may occur

during or after work hours and may be relieved by taking salted liquids by mouth.

LESSENING STRESSFUL CONDITIONS

Attempts have been made to reduce the hazards of heat stress by introducing engineering controls, training workers in the recognition and prevention of heat stress, and implementing work-rest cycles. Heat stress depends, in part, on the amount of heat the worker's body produces while a job is being performed. The amount of heat produced during hard, steady work is much higher than that produced during intermittent or light work. Therefore, one way of reducing the potential for heat stress is to make the job easier or lessen its duration by providing adequate rest time.

Rest Areas. Providing cool rest areas in hot work environments considerably reduces the stress of working in those environments. There is no conclusive information available on the ideal temperature for a rest area. However, a rest area with a temperature near 76°F appears to be adequate and may even feel chilly to a hot, sweating worker, until acclimated to the cooler environment. The rest area should be as close to the workplace as possible. Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter but frequent work-rest cycles are the greatest benefit to the worker.

Drinking water. In the course of a day's work in the heat, a worker may produce as much as 2 to 3 gallons of sweat. Because so many heat disorders involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced. Most workers exposed to hot conditions drink fewer fluids than needed because of an insufficient thirst drive. A workers, therefore, should not depend on thirst to signal when and how much to drink. Instead, the worker should drink 5 to 7 ounces of fluids every 15 to 20 minutes to replenish the necessary fluids in the body. There is no optimum temperature of drinking water, but most people tend not to drink warm or very cold fluids as readily as they will cool ones. Whatever the temperature of the water, it must be palatable and readily available to the worker. Individual drinking cups should be provided. Never use a common drinking cup. Heat acclimatized workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average American diet contains sufficient salt for acclimatized workers even when sweat production is high. If, for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. **Salt tablets should not be used.**

Be Safe!!

